REMARKS/ARGUMENTS

All claims stand rejected over the teachings of U.S. Patent 4,636,088 either alone or in combination with U.S. Patent 4,513,384. In addition, Claims 2-6, and 8 were rejected as being indefinite under 35 USC 112, second paragraph.

Specifically, Claim 2 was rejected for having no antecedent basis for "the predetermined frequency", and for having no connection to the structure of Claim 1. Claim 1 has been amended to recite that the first beam has its power modulated at a frequency that is predetermined, thereby to provide antecedent basis for the "predetermined frequency" of Claim 2. Claim 2 is also amended to recite that a second beam is used during the act of measuring of Claim 1. Claim 2 also now states that the maximum frequency is a frequency beyond which nonlinearities in temperature response become noticeable. Support for this change to Claim 2 is found throughout the originally-filed application, including, for example, page 12, lines 21-22. Moreover, Claim 8 has been amended to now depend from Claim 2. Accordingly, Applicants respectfully request the Examiner to withdraw all rejections under 35 USC 112, second paragraph.

In this context, Applicants believe that there has been no change in the scope of the claims due to the above-discussed amendments. If the Examiner believes otherwise, Applicants respectfully request the Examiner to make a statement in the record explaining any perceived change in scope and the reasons thereof, so that Applicants can respond appropriately.

Claim 1 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 4,636,088 granted to Rosencwaig et al. Specifically, on page 3 of the Office Action the Examiner stated that (1) Rosencwaig shows a method for determining a property of a portion of a structure having a first layer, citing column 4, lines 50-61, column 6, lines 45 and elsewhere for a discussion of "layers"; (2) Rosencwaig teaches generating a first beam (34) of electromagnetic radiation citing column 6, lines 20-24; (3) Rosencwaig teaches focusing the beam onto a region of a first layer (column 6, lines 32-33) and that as the beam is focused on the sample the sample may include a top layer, it is necessarily true that the beam is focused onto a region of the first layer; (4) Rosencwaig measures a temperature change in the surface of the sample (column 7, lines 3-5, and column 8, lines

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1-4); and (5) Rosencwaig uses a relationship between temperature change and an electrical conductive property (dopant level; see column 10, lines 1-21).

Claim 1 is amended by adding several limitations. First, Claim 1 now requires power to be modulated at a frequency sufficiently low to ensure that temperature of the heated region varies linearly relative to the modulated power. Support for this amendment to Claim 1 is found throughout the originally-filed application, including, for example, page 5 lines 7 and 15, page 6 line 19, and page 12 line 5. Second, Claim 1 requires the method to be performed on a structure in which the first layer comprises at least one crystalline phase of a compound of the underlying layer. Support for this amendment to Claim 1 is found throughout the originally-filed application, including, for example, page 4, lines 11-16 and page 6, lines 5-15. Third, Claim 1 requires the method to be performed on a structure in which the first layer transmits at least 10% of the power of the first beam incident thereon. For support, see page 20 line 2, page 27 line 20, and page 27 line 31 of the originally-filed specification.

Several limitations now present in Claim 1 are not disclosed or suggested in the teachings of U.S. Patent 4,636,088 granted to Rosencwaig et al. Claim 1 now limits application of the method to a specific structure that is nowhere disclosed or suggested in the teachings of U.S. Patent 4,636,088. Specifically, in the Examiner-cited column 4, lines 50-61, column 6, lines 45 and elsewhere of U.S. Patent 4,636,088 (see page 3 of the Office Action) there appear to be references to only "residue" and "dopant" regions as seen from the following text (emphasis added):

> Where the **residue** layer or perturbed **dopant** region is greater than 100 Angstroms thick, the thermal parameters of the surface layer will also have an effect on the periodic reflectivity signal ΔR_T. As can be appreciated, the layer of interest will have thermal characteristics that are different from the underlying substrate. When this layer is extremely thin, the thermal characteristics are defined almost entirely by the underlying substrate. However, when the thickness of the layer of interest is increased, its effect on the th rmal characteristics of the system will be evident through its effect on the periodic surface temperature ΔT.

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There is no suggestion whatsoever in the above-quoted text that the method of U.S. Patent 4,636,088 is to be used with a structure in which the first layer is at least **10% transmissive** and comprises at least one **crystalline phase** of a compound of the underlying layer.

Moreover, there appears to be no indication in U.S. Patent 4,636,088 that Rosencwaig's method would work on the claimed structure. Since a layer that is at least 10% transmissive and includes a crystalline phase of a compound of the underlying layer is likely to have different physical properties as compared to a residue layer and a dopant region which were described in U.S. Patent 4,636,088, a skilled artisan would not be motivated to perform the method of Claim 1. In order to make an obviousness rejection, the burden is on the Examiner to identify a motivation in a specific prior art reference. In this context, the Examiner is respectfully requested to heed the statement by Court of Appeals for the Federal Circuit that "In rejecting a patent applicant's claims, the PTO board erred in stating that it could reach a conclusion of obviousness based on "common knowledge and common sense of a person of ordinary skill in the art without any specific hint or suggestion in a particular reference." See In re Lee, 277 F.3d 1338, 61 USPQ.2d 1430 (Fed. Cir. 2002).

Not only is there no suggestion or motivation to apply the prior art method to the claimed structure, Applicants submit that there is no suggestion whatsoever in U.S. Patent 4,636,088 to use such measurements to distinguish between (and identify) which one of two or more crystalline phases may be present in such a structure. Specifically, U.S. Patent 4,636,088 at most indicates that a layer's thickness may be identified from a measured signal (see column 4, line 25). In contrast, Claim 1 now requires using the measured signal to determine an **electrical conductive property which depends on** (and is therefore indicative of) **crystalline phase**.

Applicants submit that in view of the above-discussed reasons, Claim 1 patentably distinguishes over the teachings of U.S. Patent 4,636,088. Claims 2-18 depend from Claim 1 and are therefore patentable for at least the same reasons as those discussed above for Claim 1.

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Many of Examiner's comments on the teachings of U.S. Patent 4,636,088 are rendered moot in view of the above-discussed reasons for patentability. However, there is

one point the Examiner should bear in mind in responding to the current amendment. Specifically, the modulation frequency at which a thermal wave is generated spans a **continuum**, and the thermal wave may or may not affect a measurement in a wafer depending on several factors, such as the geometry of the structure being evaluated (which may reflect a thermal wave) and the composition (e.g. material density and thermal conductivity).

Applicants have realized that when the wavelength of a thermal wave is made very long compared to the region of measurement then the effects of the thermal wave may be effectively ignored when evaluating wafers. See an example in the originally-filed application at page 12, line 15 wherein Applicants stated that at the modulation frequency of 15 kHz, a thermal wavelength of 100 μm is obtained, which is two orders of magnitude larger than a 1 μm region (evaluated by a probe beam of 1 μm diameter).

Nowhere in the entirety of U.S. Patent 4,636,088 is there any disclosure or suggestion on how to minimize the effect of thermal waves. Moreover, the formula at the bottom of column 5 of U.S. Patent 4,513,384 merely suggests that the thermal diffusion length may be calculated, without further suggesting the need to avoid thermal wave creation. In contrast, Claim 5 recites an upper limit on the frequency of modulation of the first beam power, which has been described in the originally-filed application as being for reducing or eliminating the effect of thermal waves.

In addition, Applicants respectfully traverse the Examiner's statements that rely on the Applicants' invention description. Specifically, the Examiner stated "The **instant** disclosure teaches that the modulation frequency in the instant invention ... If 100 kHz of the **instant** disclosure meets ... " (emphasis added; see page 4 of the Office Action). Applicants submit that a future rejection of any claim must be made without reference to and independent of any knowledge the Examiner gained from reviewing the Applicant's invention disclosure. The Examiner must show, from just the prior art alone, that any frequency greater than 50 kHz modulation as described in U.S. Patent 4,636,088 necessarily meets all the claim limitations (regardless of whether or not Applicants' 100 kHz embodiment meets the same limitations).

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Applicants also respectfully traverse the Examiner's rejection of Claims 11 and 15-18 on page 7 of the Office Action as being not supported by the only reference cited

against these claims, namely U.S. Patent 4,636,088. Instead of relying on "general" teachings of this reference, the Examiner must show where does this reference teach the limitations being claimed. The Examiner must identify the column and line number where each limitation of Claims 11 and 15-18 is disclosed by U.S. Patent 4,636,088.

Claim 19 was rejected for reasons similar or identical to Claim 12 and Applicants believe Claim 19 to be patentable for at least the same reasons as Claim 12. Applicants submit that Claim 19's recitation of a limitation on the modulation frequency renders such an apparatus patentable over the teachings of U.S. Patent 4,636,088.

Regarding the rejection of Claim 20, Applicants submit that the Examiner has failed to identify (by column and line number) a specific hint or suggestion in U.S. Patent 4,636,088 the need for determining if the reflected power is greater than a predetermined power. The Examiner's mere indication that such an act can be performed does not rise to the level of a prior art suggestion or motivation to perform the act. Some evidence in the prior art must be explicitly cited, absent which Claim 20 should be allowed.

Claim 21 has been amended to require that the method be performed on a wafer comprising at least one of a plurality of silicides, whose roughness is a function of crystal phase. For support, see page 22, lines 1-14. In this context, Applicants note that there is no suggestion whatsoever in U.S. Patent 4,636,088 that their disclosed method is to be used with silicides, or for that matter with any non-flat surfaces (see page 22, line 5 of Applicants' specification).

For the above reasons, Applicants respectfully request allowance of all pending claims. Should the Examiner have any questions concerning this response, the Examiner is invited to call the undersigned at (408) 982-8200, ext. 3.

CERTIFICATE OF FACSIMILE TRANSMISSION
I hereby certify that this correspondence is being facsimile transmitted to the U.S. Patent and Trademark Office to the fax number 703-872-9318 on November 6, 2003.

S. Omkar Nov. 6, 2003
Attorney for Applicant(s) Date of Signature

Respectfully submitted,

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